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Subject: Response to NIST Recommendations
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To: <wtc@nist.gov>

The Structural Engineering Institute respectfully submits the attached comments in response to the NIST WTC Recommendations. If it's not too much trouble, I would appreciate notification of receipt of this attachment.

Thank you, and best regards,
Mary Ellen

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**SEI's Comments on the National Institute of Standards and Technology's
World Trade Center Investigation Recommendations**

**Submitted to NIST
August 3, 2005**

The events at the World Trade Center in New York City on September 11, 2001, were the worst building disasters in the history of the United States. The National Institute of Standards and Technology conducted a building and fire safety investigation of the disaster under the authority of the National Construction Safety Team Act (15 USC 7301 et seq). As a result of its WTC Investigation, on June 23, 2005 NIST issued a draft report with recommendations, and invited public comments on June 23, 2005.

The Board of Governors of the Structural Engineering Institute of the American Society of Civil Engineers held a meeting on July 1, 2005, to discuss the NIST WTC report. The meeting was attended by SEI Board members Jeremy Isenberg, Gene Corley, Barry Goodno, Neil Hawkins, Joe Ales, Robert Ratay, James Rossberg, James Harris, and Rawn Nelson. The following are the group's comments on behalf of SEI/ASCE on the recommendations of NIST's WTC report.

SEI supports a thorough review and deliberation of all of the NIST Recommendations and looks forward to further discussions clarifying the situations to which the NIST Recommendations should apply.

SEI believes that engineers must avoid over-optimistic reassurances about building safety, and agrees that increased efforts should be focused on preventing terrorist attacks. That said, the 30 recommendations presented by NIST within eight categories address a range of issues that we at SEI think require serious discussion. Many of the recommendations were presented by NIST as "changes to codes and standards," which some may interpret to mean that the painstaking process of developing consensus code and standard provisions should be unreasonably accelerated. We believe that the consensus process, which is already underway at SEI for some of the concerns NIST has raised, is essential so that all aspects of an issue can be considered. All of the issues deserve further consideration in that community.

In the view of SEI, at least some of the NIST recommendations will require development of new technologies and close examination of their effects upon the practice. At the same time, the existing codes and standards processes that are already in place, both in and outside SEI, provide appropriate mechanisms for advancing several of these discussions. Ultimately, the implementation of these recommendations will require the development of appropriate thresholds and bounds for their application. SEI looks forward to taking an integral role in clarifying the application of these recommendations.

In fact, some of the NIST recommendations follow actions previously initiated by SEI. For example, with respect to Recommendation #2, SEI is close to issuing a Wind Tunnel

Testing standard and anticipates opening it for public comment in the fall of 2005. With respect to Recommendation #9, SEI has been working with the Society of Fire Protection Engineers, and has already prepared a draft to update ASCE/SEI/SFPE 29-99 (Standard Calculation Methods for Structural Fire Protection), by incorporating performance-based fire resistant design. With regard to Recommendation #27, we look forward to engaging ASCE's professional practices committee for comment and guidance, though our initial reaction is that it may not be necessary or beneficial to all parties for the Engineer of Record to retain all documents for all time; our preliminary view on document retention is that the owner should retain the drawings.

The Board of SEI favors the development of tools to assist engineers in addressing the issue of progressive collapse (Recommendation #1). The development of a consensus standard providing multiple approaches to mitigating progressive collapse would benefit the profession by providing concepts and techniques upon which to build. It is worth noting that GSA requirements have already advanced technology for evaluating progressive collapse. In general, the Board of SEI prefers a building-specific and/or owner-specific approach to mitigating progressive collapse rather than a code-mandated requirement.

However, also with respect to Recommendation #1, the SEI Board reserves judgment on whether and how to develop standardized software to evaluate the susceptibility of a particular structural system to progressive collapse. Not all buildings are at risk of being exposed to the type of events commonly associated with initiating progressive collapse. This NIST recommendation needs study of its application and its effect upon the profession because of the various design thresholds involved. When considering possible causation events, other, non-structural, solutions are sometimes effective. Having said that, we look forward to discussing who would develop and maintain the potential software, who would distribute it and who would take responsibility for training the profession in its use.

SEI agrees that designing for fire performance of structures (Recommendations #4-7) needs to be discussed within the broad engineering profession, and is interested in taking an active role in supporting studies examining these recommendations. A draft has been prepared and we would welcome NIST's input in furthering the development of this standard. The concept embedded in Recommendation #8 of treating fire as a load case for structural design will necessitate assumption concerning fire protection systems. Their historical performance will need to be included in the discussions along with the technical and economic impact.

SEI feels that some of the NIST recommendations need further clarification and discussion. SEI would like a clearer description of the rationale and motivation for developing limit state criteria in Recommendation #3. It is possible that serviceability, perception of motion issues, and existing seismic criteria on drift may satisfy this recommendation. While much of Recommendation #25 appears to SEI to be reasonable, the concept of certification of "as-designed or as-built" safety needs additional discussion and understanding. Without further understanding of the envisioned intent of this

recommendation, its implementation may face numerous technical, economic, and authoritative hurdles. Improving safety in existing buildings, as directed in Recommendation #26, is certainly a laudable goal and one that SEI supports. While the existence of as-built drawings would assist in the rehabilitation of existing structures as specified in Recommendation #26, a requirement for the retention of a broad range of documents would not improve the safety or performance of structures. Lastly, the roles of various professionals within a project will change and vary from project to project. The assignment of roles and responsibilities is an issue best handled by the contract documents rather than codes and standards, as proposed in Recommendation #28.

We are particularly encouraged by the recommendations pertaining to education and we enthusiastically support continuing education of the profession. However, specific issues, such as cross-training of fire and structural engineering professionals, need to be clarified in further discussions.

Our profession is responsible for protecting the public to the best of our abilities and to seek new technologies to help us meet that charge. In order to do that, we feel it is important to draw a distinction between advancing the technology through the development of various tools, such as consensus documents on progressive collapse and fire-structure interaction, and potentially adversely affecting the profession by imposing regulations and restricting the engineers' freedom to develop the best solution for each individual building and the embedding of mandatory provisions in building codes.

While not every NIST recommendation may be ready for enactment as is, SEI is moving forward with discussion of the issues and their implications for structural engineering practice, and looks forward to working closely with NIST to clarify the application of these recommendations.

NIST Recommendations Referenced:

- 1 – Progressive collapse
- 2 – Wind Tunnel Testing Standard
- 3 – Sway requirement
- 4 – Construction classification and fire rating requirements
- 5 – Fire resistance testing
- 6 – Spray-applied fire resistive materials standards
- 7 – Uniform fire protection
- 8 – Fire as a load case
- 9 – Performance based fire resistant design
- 25 – Third party review
- 26 – Egress and sprinkler requirements in existing buildings
- 27 – Document retention
- 28 – SE/FPE responsibilities and liabilities